Gulf Cooperation Council

EDICT OF GOVERNMENT

GSO 56 (1987) (English): INDUSTRIAL SAFETY AND HEALTH REGULATIONS - HAZARDOUS MATERIALS - GASES PART 2: ACETYLENE

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STANDARDIZATION ORGANIZATION FOR G.C.C (GSO)

GSO 56/1987

اشتراطات السلامة والصحة الصناعية
المواد الخطرة – الغازات
الجزء الثاني : الاسيتيلين

INDUSTRIAL SAFETY AND HEALTH REGULATIONS - HAZARDOUS MATERIALS - GASES
PART 2: ACETYLENE

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INDUSTRIAL SAFETY AND HEALTH REGULATIONS - HAZARDOUS MATERIALS - GASES
PART 2: ACETYLENE

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INDUSTRIAL SAFETY AND HEALTH REGULATIONS - HAZARDOUS MATERIALS - GASES PART 2: ACETYLENE

1. SCOPE AND FIELD OF APPLICATION

1. This Standard is concerned with piped systems for acetylene at pressure 0 to 6.865 kPa for low pressure, and from 6.963 kPa and up for high pressure. Also it is applied to generating of acetylene and charging of acetylene cylinders either separately or in conjunction with charging other compressed gases.

In case of combined operation, this standard shall apply to only acetylene generators and charging, provided these operations are confined to special rooms or areas. It does not apply to generating and charging acetylene for the purpose of welding.

2. COMPLEMENTARY REFERENCES

2.1 GSO 55/1987 “Industrial Safety and Health Regulations - Hazardous Materials - Gases - Part 1: General Requirements”.

2.2 GSO 220/1994 “Industrial Safety and Health Regulations - Welding, Cutting and Brazing”.

2.3 GSO 215/1994 “Industrial Safety and Health Regulations - Equipment - Tanks, Pressure Vessels, Boilers and Compressed Gas Equipment”.

2.4 GSO 218/1994 “Industrial Safety and Health Regulations - Electrical Part 2: Low Voltage.

3. DEFINITIONS

3.1 Acetylene Operations: Includes acetylene generation, storage, purifications, compression, cylinder filling, cylinder storage and calcium carbide storage.

3.2 Appurtenances: Devices such as pumps, compressors, safety relief devices, liquid level gauging devices, valves and pressure gauges.

3.3 Container: Any vessel, tank, cylinder, or spherical drum used for transportation, storage or application of gas.

3.4 Container Assembly: Includes the container with fitting for all container openings, including shut off valves, excess flow valves, liquid level gauging devices and protective housing.

3.5 Cylinder: A container 500 litres capacity or less.

3.6 Gasholder: Storage system at distribution pressure.

4. REGULATIONS

4.1 Cylinder System

4.1.1 Cylinder design, construction, marking and labelling shall comply with the Gulf Standard mentioned in item 2.1 except that for truck or car loads, a red label designating flammable shall be attached.

4.1.2 Storing of cylinders shall comply with the Gulf Standard mentioned in item 2.1 except that cylinders stored inside rooms shall be limited to 60 cu. m of gas at standard conditions, exclusive of cylinders in use or attached for use. Cylinders shall be stored in upright position.

4.1.3 Handling and using of cylinders shall comply with the Gulf Standard mentioned in item 2.1 and as follows:

The use of acetylene for welding shall comply with the Gulf Standard mentioned in item 2.2,

- Acetylene shall not be distributed at pressure exceeding 103 kPa. (Note: May be stored as stated in item 4.1.4).
- Cylinders shall be used in upright position only.
- A torch shall not be used to raise the cylinder pressure.
- To minimize the withdrawal of liquid, acetylene shall be withdrawn from a cylinder at a rate not to exceed 1/7 of the capacity of the cylinder per hour.

4.1.4 Filling and Refilling

Internal pressure of cylinder when filled shall not exceed 1765 kPa. Charging of cylinder shall be done by authorized personnel only.

4.1.5 Cylinders shall be provided with valves and safety devices complying with the Gulf Standard mentioned in item 2. 1.

4.1.6 Piping shall be designed considering possibility of detonation.

4.2 Piped Acetylene Distribution Systems

4.2.1 General

4.2.1.1 Copper, silver and mercury shall not be used. Copper alloys approved by GCC may be used.

4.2.1.2 Pressure vessel design shall be in accordance with the Gulf Standard mentioned in item 2.3.

4.2.1.3 Piping and equipment shall be electrically bonded and grounded. Resistance to ground shall not exceed 10 ohms. Flanged and bolted connections shall use jumpers for continuity of grounding.

4.2.1.4 Cold weather protection shall be provided for water saturated acetylene system where an accumulation of water may freeze. Any possibility of overheating shall be prevented.

4.2.1.5 System shall be maintained and periodically inspected provided that this period not exceed one year.

4.2.2 Piping

Piping system shall be designed and installed in accordance with the Gulf Standard mentioned in item 2.1, and as noted below.

4.2.2.1 Welded and seamless carbon steel is acceptable. Screwed malleable iron fittings may be used for 3.8 cm and smaller size. Larger size joints shall be welded or flanged.

4.2.2.2 Packing and lubricant shall be free of copper bearing materials.

4.2.2.3 Main transmission lines shall be 15 m from buildings, fire fighting facilities and flammable liquid tanks.

4.2.2.4 Expansion joints should be avoided. If used, the joint shall be corrosion resistant.

4.2.2.5 Provisions for purging shall be provided. Dead end connections which cannot be purged shall not be used.

4.2.2.6 Overhead pipe lines shall be protected from atmospheric corrosion.

4.2.3 Equipment

4.2.3.1 Storage equipment at distribution pressure (gas holder)

4.2.3.1.1 Design shall be in compliance with the Gulf Standard mentioned in item 2.3.

4.2.3.1.2 Gasholders shall be located at least 15 m from buildings and 8 m from property lines.

·4.2.3.1.3 High and low level indicator alarms on gas holders shall be located in control rooms.

4.2.3.1.4 When gasholders are located indoors, they shall comply with the Gulf Standard mentioned in item 2. 1.

4.2.3.1.5 The gasholders, purifiers and driers shall be provided with inlet and outlet shut off valves accessible for closing in emergency.

4.2.3.1.6 Gasholders shall be labeled: “DANGER - EXPLOSIVE GAS” in letters 15 cm high.

4.2.3.2 Booster equipment including compressor coolers, separators, control valves etc. shall comply with the Gulf Standard mentioned in item 2.3.

4.2.4 Safety devices shall comply with the Gulf Standard mentioned in item 2. 1. and as follows:

4.2.4.1 Rupture discs or relief valves shall be used.

4.2.4.2 Rupture discs shall not be used in piping systems having the hydraulic back pressure valve where the sudden venting will, cause the loss of the liquid in hydraulic valve.

4.2.4.3 Rupture discs shall have bursting pressure of 196 kPa for high pressure and 58.84 kPa for low pressure distribution system.

4.2.4.4 Minimum recommended diameter for rupture disc is 15 cm. In no case shall it be less than the pipe diameter.

4.2.4.5 Relief valves used for distribution service and shall be set to operate to prevent the pressure from exceeding 137.3 kPa.

4.2.4.6 Gas shut off valves, remotely actuated from strategically located push button station shall be provided.

4.2.4.7 An electrically or pneumatically operated vent valve shall be installed at one or more high point locations for emergency use.

4.3 Generating and Charging Plants

4.3.1 Location

4.3.1.1 Acetylene plant location or special room location shall comply with the Gulf Standard mentioned in item 2.1, except as noted below.

- Building shall be at least 15 m from adjoining property or public right-of-way.
- Signs and guarding or fencing shall be provided.
- Explosion venting requirement shall not apply to calcium carbide storage rooms.
- Explosion venting area shall not be less than 1 sq. m/50 cu. m.
- Ventilation shall be provided. Ceiling vents shall be nonclosing type.

4.3.2 Generator

4.3.2.1 The height of generator shall be restricted to one story building or room. Two story building, if used, shall have second story used for charging the generator with calcium carbide. Outside installation is permitted only if protection from rain is provided.

4.3.2.2 Water shall not be supplied through a continuous connection to the generator except when generator is provided with overflow or automatic water shut off which will effectively prevent overfilling of generator and means of preventing back flow of acetylene from generator to pipe.

4.3.2.3 Generator shall be equipped with pressure relief device which shall be installed in accordance with the Gulf Standard mentioned in item 2. 1. The maximum pressure setting of relief valve shall be 127.5 kPa.

4.3.2.4 The relief vent piping shall be carried full size to a suitable point outside the building. It shall terminate in hood or bend located at least 3.7 m above the ground, preferably above the roof. It shall be at least 8 m from sources of ignition. The hood or bend shall be so constructed that it will not be obstructed by rain, insects or birds.

4.3.2.5 Relief pipes from two generators shall not be interconnected, however, two relief pipes from single generator may discharge into common vent.

4.3.2.6 Temperature of 50'C or more shall be maintained in acetylene generating plants or rooms except in carbide storage rooms.

4.3.2.7 Electrical equipment for rooms shall comply with the Gulf Standard mentioned in item 2.4, and shall be Class 1, Group A, Division 1.

4.3.2.8 The water carbide residue mixture drained from the generator shall not be discharged into sewer pipes or stored in areas with open flame. Receptacles for such discharge shall comply with the relevant Gulf Standards.

4.3.3 Calcium Carbide Storage

4.3.3.1 Containers and Storage area shall be properly marked with wordings "CALCIUM CARBIDE - DANGEROUS IF NOT KEPT DRY" or equivalent.

4.3.3.2 Containers which have been in storage for the longest period shall be used first.

4.3.3.3 The bottom tier of each row shall be placed on wooden planking or equivalent, so that containers will not come in contact with ground or ground water.

4.3.3.4 Storage area shall be at least 3 m from adjoining property.

4.3.3.5 Steam or water lines shall not be permitted in storage area.

4.3.4 Compressors

4.3.4.1 Compressors shall be designed and constructed in accordance with the Gulf Standard mentioned in item 2.1, with the following additional requirements,

- Provision shall be made to cool acetylene after each stage of compression. Water cooling when used shall have flow visible from intercoolers to jackets.
- There shall be a safety relief valve between each stages and no shut off valve between safety relief and compressor.
- Inlet and outlet piping shall be equipped with accessible emergency shut off.
- Relief vent piping shall be installed as specified for generators in items 4.3.2.4 and 4.3.2.5.
- Drainlines from oil separators and condensate traps shall be located away from source of ignition.
- Suction line shall have pressure switch to shut down the compressor when suction pressure falls below 2.5 cm of water column below atmosphere. There shall be no valves between pressure switch and inlet.
- Discharge line from compressor shall be equipped with pressure switch to restrict discharge pressure to the required operating pressure but in no case to more than 2746 kPa. Any valve between compressor and pressure switch shall have positive lock open device.

4.3.5 Piping shall comply with the Gulf Standard mentioned in item 2.1 and in item 4.2.2, and as follows:

4.3.5.1 For all acetylene piping design pressure shall be 19615 kPa and test pressure for piping excluding pressure gauges, relief valves, regulators and diaphragm valves shall be 29423 kPa.

4.3.5.2 Cylinder charging leads shall have burst pressure rating of 41191 kPa.

4.3.6 Cylinder Charging Manifold and Acetylene Equipment

4.3.6.1 Each cylinder charging manifold shall be equipped with shut off valve and blowdown valve vented outside; check valve in charging manifold or charging lead; and pressure gauge downstream of the shut off valve.

4.3.6.2 Location of charging shall be away from storage. Acetylene storage tanks in excess of 210 litres shall be at least 8 m from acetylene cylinders and other flammable gas.

4.3.7 Fire Protection

4.3.7.1 Fire protection equipment or system shall not be of water type for calcium carbide area. Only dry powder extinguishers are effective.